Development of a scoring system based on conventional parameters to assess polytrauma patients: PolyTrauma Grading Score (PTGS)

Frank Hildebrand\textsuperscript{a}, Rolf Lefering\textsuperscript{b}, Hagen Andruszkow\textsuperscript{a,c}, Boris A. Zelle\textsuperscript{d}, Bilal M. Barkatali\textsuperscript{e}, Hans-Christoph Pape\textsuperscript{a,}\textsuperscript{f}

\textsuperscript{a} Department of Orthopaedic Trauma at Aachen University, NRW, Germany
\textsuperscript{b} Institute for Research in Operative Medicine (IFOM), Cologne, NRW, Germany
\textsuperscript{c} Harald Euchner Research Laboratory for Orthopaedic Trauma at Aachen, NRW, Germany
\textsuperscript{d} The University of Texas Health Science Center at San Antonio, TX USA
\textsuperscript{e} Department of Trauma and Orthopaedics, Royal Bolton Foundation NHS Trust, UK

\textbf{KEYWORDS}
Polytrauma patients
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\textbf{ABSTRACT}

\textbf{Background}: The impact of conventional laboratory data to identify polytrauma patients at risk of complications is established. However, it has not been assessed in terms of prognostic accuracy for systemic complications (ARDS, organ failure). We therefore assessed the most predictive parameters for systemic complications and developed a scoring system for early grading of polytrauma patients.

\textbf{Methods}: A population based trauma registry was used. Inclusion criteria: age >16 years, Abbreviated Injury Score (AIS) of the abdomen or chest ≥3 points and treatment in an intensive care unit, or Injury Severity Score (ISS) ≥16 points. The primary endpoint was hospital mortality. Patients were graded according their risk of death: low risk of death (5-14% mortality), intermediate risk patients (15-39% mortality) and high risk (>40%). Routine clinical and laboratory parameters on admission were assessed to determine their specific relevance to describe the risk profile of the patient. Based on these data, a scoring system for the description of the clinical status was developed. Statistical analysis included univariate and multivariate analyses.

\textbf{Results}: 11,436 patients were included, the mean ISS was 22.7 ± 11.2 points, 73% were male, and 95.6% had blunt injuries. The most sensitive parameters were found to be the following ones: systolic blood pressure, INR, thrombocytes, base deficit, NISS, packed red blood cells administered. The multivariate analysis revealed the following threshold levels: BP ≥90 mmHg; INR ≥0.249, OR 1.283; Base deficit 8-10 R = 0.474, OR 1.606; INR 1.4-2 r = 0.160, OR 1.174; NISS 35-39 r = 0.9, OR 2.46; pBRC 3-14; r = 0.671, OR 1.957. The following ranges of score values were found to be associated with different patient status: <6 points: stable patients; 6-11 points: borderline condition; >11 points: unstable patients. When using this score, 89.6% were stable, 14.6% in a borderline condition and 4.8% unstable.

\textbf{Conclusion}: We developed a scoring system to discriminate polytrauma patients on admission that are at risk of systemic complications. Systolic blood pressure, INR, thrombocytes, base deficit, NISS, packed red blood cells administered are able to provide a prognosis of patients at risk of posttraumatic complications. Further prospective studies should be performed to verify this new scoring system.

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\textbf{Introduction}

Early assessment of the patient condition is crucial to avoid further complications and plan the surgical strategy [1-3]. Several modes to safely clear patients for major surgery have been recommended, including assessment of resuscitation [4] and clinical parameters [4]. Among these were Injury Severity Score (ISS) values greater than 40 points [5] and other physiological changes in association with injury scoring [6,7]. Moreover, parameters indicative of the triad of death [8] were recommended [9]. Since then, the clinical use and the relevance of some of these parameters have decreased as follows: Chest computed tomography is preferred to plain chest films to diagnose lung contusions. Pulmonary arterial pressure monitoring has been replaced by other methods to assess intraparenchymal non-cardiac pulmonary edema [10]. We therefore felt that further study is needed to identify certain subgroups of patients at increased risk for complications. An updated, new assessment appears to be helpful in ascertaining reliability of risky situations, such as the borderline condition [11,12].